Remarks

The Office Action mailed October 20, 2006, has been carefully reviewed and the foregoing amendments and following remarks have been made in consequence thereof.

Claims 1-32 are now pending in this application. Claims 1-3, 6-9, 13-15, 17-20, 24-26, and 28-30 stand rejected. Claims 4, 5, 10-12, 16, 21-23, 27, 31, and 32 stand objected to. Claims 1, 13, and 25 have been amended. No new matter has been added.

The rejection of Claims 1 and 25 under 35 U.S.C. § 102(b) as being anticipated by Harvey (U.S. Pat. No. 6,275,038) ("Harvey") is respectfully traversed.

Harvey describes a method for evaluating inhomogeneity in a magnetic polarizing field. The method includes acquiring data using a first k-space scan ($S1(k_x,k_y)$) and a second k-space scan ($S2(k_x,k_y)$) during a single application of a magnetic resonance imaging (MRI) pulse sequence (70). The second k-space scan ($S2(k_x,k_y)$) is time delayed from the first k-space scan ($S1(k_x,k_y)$). A first spatial image (IM1(x,y)) and a second spatial image (IM2(x,y)) are generated from the first k-space scan ($S1(k_x,k_y)$) and the second k-space scan ($S2(k_x,k_y)$), respectively. A first measurement of inhomogeneity is generated from the first spatial image (IM1(x,y)), and a second measurement of inhomogeneity is generated from the second spatial image (IM2(x,y)). A measurement of the change is determined by the difference between the first and second measurements of inhomogeneity with respect to phase difference and the time delay. The measurement of the change then is used to correct for instrumental error phase accumulation.

Claim 1 recites a method for generating an estimate of inhomogeneity, the method including "acquiring an image; generating a first estimate of inhomogeneity using the acquired image; generating a second estimate of inhomogeneity using the acquired image; and generating a final estimate of inhomogeneity using at least the first and second estimates."

Harvey does not describe or suggest a method for generating an estimate of inhomogeneity as recited in Claim 1. Specifically, Harvey does not describe or suggest a method that includes generating a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of

inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image. Harvey does not describe or suggest a first and a second estimate of inhomogeneity using one acquired image.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Harvey.

Claim 25 recites a computer readable medium encoded with a program configured to instruct a computer to "acquire an image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates."

Harvey does not describe or suggest a computer readable medium encoded with a program configured to instruct a computer as recited in Claim 25. Specifically, Harvey does not describe or suggest a computer readable medium encoded with a program to instruct a computer to generate a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image. Harvey does not describe or suggest a first and a second estimate of inhomogeneity using one acquired image.

Accordingly, for at least the reasons set forth above, Claim 25 is submitted to be patentable over Harvey.

For the reasons set forth above, Applicant respectfully requests that the Section 102(b) rejection of Claims 1 and 25 be withdrawn.

The rejection of Claims 2, 3, 6-9, 26, and 28-30 under 35 U.S.C. § 103(a) as being unpatentable over Harvey in view of Gur et al. (U.S. Pat. No. 5,627,907) ("Gur") is respectfully traversed.

Harvey is described above. Gur describes a method for detecting abnormal regions in living tissue depicted in a radiograph. A first stage (S100) includes identifying suspected abnormal regions. During the first stage (S100) the image is manipulated (S2-S7), including performing a non-linear thresholding (S5), to identify suspected regions. Two Gaussian low-pass filters and/or a bandpass filter may be used during the first stage (S100). A second stage

(S150) includes removing false-positives from the set of suspected abnormal regions found in the first stage. Specifically, for each suspected abnormal region, multiple topographic layers of that region are extracted from a digitized radiograph and evaluated (S14) against a set of criteria defining a true-positive abnormal region. The evaluation (S14) of each layer is used to create (S26) a region vector which is then compared (S25) to the criteria to determine (S27) whether the region is abnormal.

Claims 2, 3, and 6-9 depend, directly or indirectly, from Claim 1, which recites a method for generating an estimate of inhomogeneity, the method including "acquiring an image; generating a first estimate of inhomogeneity using the acquired image; generating a second estimate of inhomogeneity using the acquired image; and generating a final estimate of inhomogeneity using at least the first and second estimates."

Neither Harvey nor Gur, considered alone or in combination, describes or suggests a method for generating an estimate of inhomogeneity as recited in Claim 1. Specifically, neither Harvey nor Gur, considered alone or in combination, describes or suggests a method that includes generating a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image, and Gur describes a stage for identifying suspected abnormal regions that may include using Gaussian low-pass filters. Neither Harvey nor Gur, considered alone or in combination, describes or suggests a first and a second estimate of inhomogeneity using one acquired image.

Because Harvey and/or Gur fail to individually teach or suggest one or more elements of Claim 1, it follows that no combination of Harvey and Gur teaches or suggests such elements. As such, and for at least the reasons set forth above, Claim 1 is submitted as patentable over Harvey in view of Gur.

When the recitations of Claims 2, 3, and 6-9 are considered in combination with the recitations of Claim 1, Applicant submits that dependent Claims 2, 3, and 6-9 likewise are patentable over Harvey in view of Gur.

Claims 26 and 28-30 depend, directly or indirectly, from Claim 25, which recites a computer readable medium encoded with a program configured to instruct a computer to "acquire an image; generate a first estimate of inhomogeneity using the acquired image;

generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates."

Neither Harvey nor Gur, considered alone or in combination, describes or suggests a computer readable medium encoded with a program configured to instruct a computer as recited in Claim 25. Specifically, neither Harvey nor Gur, considered alone or in combination, describes or suggests a computer readable medium encoded with a program configured to instruct a computer to generate a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image, and Gur describes a stage for identifying suspected abnormal regions that may include using Gaussian low-pass filters. Neither Harvey nor Gur, considered alone or in combination, describes or suggests a first and a second estimate of inhomogeneity using one acquired image.

Because Harvey and/or Gur fail to individually teach or suggest one or more elements of Claim 25, it follows that no combination of Harvey and Gur teaches or suggests such elements. As such, and for at least the reasons set forth above, Claim 25 is submitted as patentable over Harvey in view of Gur.

When the recitations of Claims 26 and 28-30 are considered in combination with the recitations of Claim 25, Applicant submits that dependent Claims 26 and 28-30 likewise are patentable over Harvey in view of Gur.

For the reasons set forth above, Applicant respectfully requests that the § 103 rejection of Claims 2, 3, 6-9, 26, and 28-30 be withdrawn.

The rejection of Claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Harvey in view of Dean et al. (U.S. Pat. No. 6,445,182) ("Dean") is respectfully traversed.

Harvey is described above. Dean describes a three-dimensional (3D) magnetic resonance imaging (MRI) system (100) that performs object-induced geometric distortion correction. The MRI system (110) includes a static magnet (132) for producing a substantially uniform magnetic field, a pulse program generator (142) for controlling a set of gradient amplifiers and coils (134), and a radio frequency transmitter (152) for causing magnetic resonance in the aligned dipoles of a subject (102). A MRI pulse sequence is

performed to acquire (202) a first 3D magnetic resonance (MR) image. The MRI pulse sequence is repeated to acquire (202) a second 3D MR image. A computer system (110) computes (210) a voxel error map based on a phase difference (204) between the first and the second 3D MR images. The computer system (110) then corrects (212) voxel positions in one of the 3D MR images in accordance with the voxel error map.

Claim 13 recites a magnetic resonance imaging (MRI) system including "a main magnet configured to generate a substantially uniform magnetic field; a radio frequency pulse generator configured to excite the magnetic field; a gradient field generator configured to generate gradients extending in different directions in the magnetic field; a receiver configured to receive magnetic field magnetic resonance (MR) signals representative of an object; and a computer operationally coupled to said receiver, said computer configured to: acquire an image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates."

Neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system as recited in Claim 13. Specifically, neither Harvey nor Dean, considered alone or in combination, describes or suggests a magnetic resonance imaging system that includes a computer configured to generate a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image, and Dean describes acquiring two magnetic resonance images to calculate a voxel error map that is used to correct one of the acquired images. Neither Harvey nor Dean, considered alone or in combination, describes or suggests a first and a second estimate of inhomogeneity using one acquired image.

Because Harvey and/or Dean fail to individually teach or suggest one or more elements of Claim 13, it follows that no combination of Harvey and Dean teaches or suggests such elements. As such, and for at least the reasons set forth above, Claim 13 is submitted as patentable over Harvey in view of Dean.

For the reasons set forth above, Applicant respectfully requests that the § 103 rejection of Claim 13 be withdrawn.

The rejection of Claims 14, 15, 17-20, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Harvey and Dean, and further in view of Gur is respectfully traversed.

Harvey, Dean, and Gur are described above.

Claims 14, 15, 17-20, and 24 depend, directly or indirectly, from Claim 13, which recites a magnetic resonance imaging (MRI) system including "a main magnet configured to generate a substantially uniform magnetic field; a radio frequency pulse generator configured to excite the magnetic field; a gradient field generator configured to generate gradients extending in different directions in the magnetic field; a receiver configured to receive magnetic field magnetic resonance (MR) signals representative of an object; and a computer operationally coupled to said receiver, said computer configured to: acquire an image; generate a first estimate of inhomogeneity using the acquired image; generate a second estimate of inhomogeneity using the acquired image; and generate a final estimate of inhomogeneity using at least the first and second estimates."

None of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a magnetic resonance imaging system as recited in Claim 13. Specifically, none of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a magnetic resonance imaging system that includes a computer configured to generate a first and a second estimate of inhomogeneity using an acquired image. Rather, Harvey describes determining a measurement of the change of inhomogeneity using two spatial images where one spatial image is time-delayed from the other spatial image, Dean describes acquiring two magnetic resonance images to calculate a voxel error map that is used to correct one of the acquired images, and Gur describes a stage for identifying suspected abnormal regions that may include using Gaussian low-pass filters. However, none of Harvey, Dean, and Gur, considered alone or in combination, describe or suggest a first and a second estimate of inhomogeneity using one acquired image.

Because Harvey, Dean, and/or Gur fail to individually teach or suggest one or more elements of Claim 13, it follows that no combination of Harvey, Dean, and Gur teaches or suggests such elements. As such, and for at least the reasons set forth above, Claim 13 is submitted as patentable over Harvey and Dean in view of Gur.

When the recitations of Claims 14, 15, 17-20, and 24 are considered in combination with the recitations of Claim 13, Applicant submits that dependent Claims 14, 15, 17-20, and 24 likewise are patentable over Harvey and Dean in view of Gur.

Moreover, Applicant respectfully submits that Section 103 rejections of Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 are not a proper rejections. Obviousness cannot be established by merely suggesting that it would have been obvious to one of ordinary skill in the art to modify Harvey with Dean and/or Gur. As explained by the Federal Circuit, "to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the Applicant." In re Kotzab, 54 USPQ2d 1308, 1316 (Fed. Cir. 2000); MPEP 2143.01.

Furthermore, as is well established, the mere fact that the prior art structure could be modified does not make such a modification obvious unless the prior art suggests the desirability of doing so. See In re Gordon, 221 USPQ2d 1125 (Fed. Cir. 1984). Furthermore, the Federal Circuit has determined that:

> [I]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fritch, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). Further, under Section 103, "it is impermissible . . . to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In re Wesslau, 147 USPQ 391, 393 (CCPA 1965). Rather, there must be some suggestion, outside of Applicant's disclosure, in the prior art to combine such references and a reasonable expectation of success must be both found in the prior art, and not based on Applicant's disclosure. In re Vaeck, 20 USPQ2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion nor motivation to combine the cited art, nor any reasonable expectation of success has been shown.

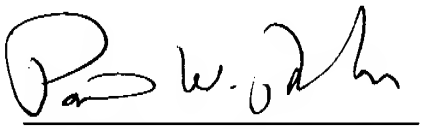
Specifically, there is no suggestion or motivation within Harvey, Dean, and/or Gur to combine Harvey with Dean and/or Gur to produce a method for generating an estimate of

inhomogeneity that includes generating a final estimate of inhomogeneity using at least a first and a second inhomogeneity estimate, where the final estimate is determined using at least one of a single acquired image and a derivative image of the acquired image. Accordingly, since there is neither teaching nor suggestion in the cited art for the claimed combination, the Section 103 rejections appear to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicant respectfully submits that Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 are patentable over Harvey in view of Dean and/or Gur.

For at least the reasons set forth above, Applicant respectfully requests the Section 103 rejection of Claims 2, 3, 6-9, 13-15, 17-20, 24, 26, and 28-30 be withdrawn.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully submitted,



Patrick W. Rasche
Registration No. 37,916
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070